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OCTOBER 1, 1898.

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THE AMERICAN ARCHITECT AND BUILDING NEWS.

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OCTOBER 1, 1898.

CONTENTS.

THE more that one hears about the new Pennsylvania State-house, at Harrisburg, the more piquant but the less savory its history is found to be. The political history of that great State and of its chief city since the Civil War is known to be scandalous in the highest degree, and the revelations that are being made by two of the gubernatorial candidates during the current campaign are as startling as they are disheartening. None of these statements particularly affect architects save one made by the Rev. Dr. Swallow, a gentleman of the highest character, who is the "honest-government" candidate for governor. Dr. Swallow naturally reprobates the action of the Capitol Commissioners from first to last, and makes the interesting allegation that the destruction of the old Capitol was due to an incendiary fire, which was the first necessary step in the development of the intended looting of the State's funds. We have often felt that in their honest endeavors to build indestructible buildings architects were turning the cold shoulder to one of their most faithful friends, the "fire fiend"; but this Pennsylvania case is one of the few we have heard of where incendiarism was alleged to have been availed of as a first step in a scheme intended for the indirect benefit of an unselected architect. Another case similar in results, though infinitely more noble in purpose, occurred last week in Cleveland, when the building occupied by the Railway Branch of the Young Men's Christian Association was destroyed by a fire of incendiary origin. It appears that a railroad engineer, down on his luck, had been taken in and cared for by the janitor of the building and was moralist enough to feel that he ought in some way to show his gratitude. Hearing the members, in conversation, repining that their building was not better fitted to their needs and having ascertained that the structure was fully insured, he brought about the temporary absence of the janitor and then soaked the building thoroughly with oil and scattered oily waste and applied the match. The work was well done, the building was destroyed and it is hard to see how the insurance companies can avoid paying the loss or how the Railway Branch can avoid having built for them the new quarters they hungered after. The incendiary admitted his act, and declared that he was not in any way interested in the result as he was not a Christian, but asserted that he was grateful. Seemingly, no exception can be taken to his statements. Perhaps the incident merely exemplifies once more to what length of self-sacrifice a truly grateful man will go, and perhaps a moral of another kind may be drawn from the tale.

THE elevator accident is generally of a startling and often of an unusual kind and its varieties are quite as numerous as those due to steam railroads, with which long familiarity has so accustomed us that their horrors can be considered without the shrinking that attends the reading of an elevator mishap. One of a rather unusual kind happened the other day when the person in charge of an elevator found, during the upward trip, that the machine was beyond his control and called out to the other occupant, a lad, to save himself if he could. The boy was agile and small and as the car passed a landing jumped on to the sill of a doorway of which the jambs were deep enough to give protection to his slim body as the car shot up. Apparently the door was a solid one, not a glazed or wire-netted door, and the boy, having nothing to cling to, looked down, became dizzy, lost his balance and fell before the car, which had been got under control, could descend and take him in again. This is only an usual form of the elevator accident and it, of course, involves, besides pain and death, the question of responsibility and damages. How far a passenger-elevator falls under the action of the laws which regulate the responsibility of the common carrier we do not know, nor do we clearly know what steps the owners of hotels, office-buildings and other structures in which one or more public elevators operate take to protect themselves in the case of lawsuits brought against them for damages because of accidents; for it seems possible that in spite of the regular inspection and insurance guaranty of the maker there may be circumstances which will visit upon the owner of the building responsibilities which he cannot avoid. We remember some years ago expressing the belief that suits brought against a railroad by an injured passenger were immoral in point of equity, since the very presence of the passenger on the scene of the accident was proof that such passenger was guilty of contributory negligence. That is, if he preferred to be hurled along over the face of the globe at forty miles an hour in place of walking at the rate of four miles, as Nature intended he should, he must himself shoulder the pains and penalties that fell upon him because of his choice of speed rates. We hold the same belief now and feel that the same argument, if it be one, applies to transit by the vertical railways. If we owned a building in which an elevator operated, we should seek to minimize our risk by fixing on the elevator-screen a notice like this: "The owner of this building has furnished it with proper and safe stairways. Those who, for their own convenience, may prefer to use the elevator do so at their own risk."

SOME years ago we asked one of the leading makers of elevators how many of these machines they had constructed during their career. The question as put could not be answered without investigation, we found; but in lieu of the fact we asked for a statement was made that at that time they had in operation and under inspection about nine hundred passenger-elevators. As there are upwards of fifty elevator-works in this country, some of them doing quite as large a business as that done by our informant, it seems fair to assume that, all together, they have in operation ten times the number of elevators named by our informant. With this factor as a starting-point and adopting a decimal enumeration for the other factors, we can arrive at some astounding figures about the vertical railway that can probably be shown to be average results very far below the truth by those who have inquired into the matter more deeply than we have. If, then, there are only nine thousand passenger-elevators in operation daily in this country, each making one ascent every ten minutes throughout the three hundred working-days each of ten hours, ascending at each trip to a height of seventy feet and carrying for that distance, on each up and each down trip, only four passengers, we assume quantities that are so far below probable actualities that it is safe to use them in computing the following deductions. If our figuring be correct, it will be found by those who care to verify it that during the year these nine thousand elevators have travelled a total vertical distance of nearly three million five hundred and eighty thousand miles upwards and the same distance downwards, and in their upwards flight have carried the respectable number of one billion and eighty million passengers and — in all but a few cases — have brought safely to earth again the same number. As the loss of life through elevator accidents as compared with this vast total must be infinitesimal, seemingly riding in elevators must be one of the safest of occupations, and the elevator-boy can count on a longer life than those employed in less favored occupations. The safe conveying of so many human beings over so great an aggregate distance, whether vertical or horizontal, is no mean accomplishment, and if the managers of horizontal traffic could make as good a showing they could well be satisfied. Fortunately the facts relating to horizontal travel are carefully collected and tabulated, and it is easy to ascertain how the danger of railroad travel compares with that of elevator travel.

IT appears, from the Report of the Interstate-Commerce Commission, that during the year ending June 30, 1897, one passenger was killed out of every two million two hundred and four thousand seven hundred and eight carried by the steam railroads of this country, the total number of passengers killed during that year being two hundred and twenty-two. Applying the ratio here established to the total number of passengers, as above, who travel by vertical railway during a year and it is found that the total mortality from accident should be nine hundred and seventy-eight during the year, and though we do not know what the elevator-accident mortality really is, we are quite certain that it is not one-tenth of the mortality of railroad passengers. People are wont to consider the railroad passenger traffic of this country as something enormous, and so it is. To carry about four hundred and ninety million persons in one year and kill only a little over two hundred of them is a very satisfactory performance, in view of the multitudinous forms in which danger may be apprehended and has to be guarded against. Yet vast as this number is it is only about a fifth as great as the number of passengers which our assumed average figures above show is annually carried with greater safety by the vertical railways. The railroad statistician seeks to show the safety of horizontal travel by proving that a given passenger could travel about fifty-five and one-quarter million miles — a distance only to be covered by travelling night and day for one hundred and fifty years at the rate of thirty-five miles an hour — before death through railway mishap came to him. But all such computations are puerile and as unproductive as to figure out the cycloidal path about this sphere of some point in the periphery of a single elevator pulley-wheel if it had to make as many revolutions as all the other pulley-wheels in daily use on nine thousand elevators. The only utility of making any examination into this matter is to point out how wrong the public is when it clamors for exemplary punishment, to be visited upon owner and elevator-maker alike, whenever a car falls and causes the death of its few passengers, while the same public accepts, as a matter of course, and without expressing very much indignation, the report of a railroad accident which occurred on the same day and caused the slaughter of thrice as many victims. One fact in connection with elevator travel must strike the passenger-agent of a horizontal road with amazement, when he thinks that the traffic is without charge to the traveller and unproductive of income to the owners of the travelling vehicle. What a dividend-payer the great Vertical Railway Company, Limited, might have been!

FEW things are more interesting to observe than the way in which the business man of to-day secures new profits by utilizing waste-products or increases his normal income by eliminating some charge which seemed unchangeably fixed. The abandoning of an expensive plant and the creating of a more costly one nearer the source of supply of the raw material is an every-day matter, and so, too, is the shipment of material partly manufactured at the source of origin, thus saving the charge for transporting a lot of waste-material to the mill or factory where formerly the entire process of transformation from raw to manufactured product used to go on. The iron industry has been the beneficiary of more of these changes, perhaps, than has any other, but we fancy that it could have occurred to few that a very large economy could be effected by the very simple means which the Carnegie Steel Company proposes to use. Having established itself at Pittsburgh, so as to be near the coal and iron fields, and created there an enormous and costly plant, the proprietors could not have foreseen that, later, they would need in their business a vast quantity of the peculiar ore found in the Mesabic Mountain range in Minnesota, upon which they must pay a large amount annually in the way of freight rates. Some one, at length, who may have been angered at having to pay for the unusable moisture contained in the brown sugar used in his own kitchen, has thought of ascertaining how much moisture was being hauled from Minnesota to Pittsburgh to the profit of the railroads and loss to the owners of the ore. It is now known that the ores from the various mines in the Mesabic range contain moisture varying in amount between 7.5 and 13.9 per cent, or an average of about ten per cent, of the weight upon which freight charges are computed. Following up this clue, it has been ascertained that by drying-out the ore at the mines before shipment a saving in freight charges of some seven hundred thousand dollars per year can be effected, if the ore can be thoroughly dried. Such a saving, or a considerable part of it, is certainly worth an effort, and Dr. N. P. Hulst, manager of the Oliver Mine, whose ore contains 11.9 per cent in weight of moisture, is now experimenting to ascertain how much of the apparent possible saving will be consumed by the cost of heating and handling at the mines, and how great a loss of the dry ore may be caused during transit through having the surface of the ore pile in the uncovered ore cars swept away in the shape of dust by strong winds.

CONSIDERING how wholly at their mercy editors and publishers hold all the rest of the world in the matter of reading, it is strange that they do not make a worse use of their power than they do; but in one respect, at least, they do not forego their advantages and readers are forced to follow the real or fictitious trials and triumphs of writers, poets, newspaper men and their natural associates, artists, of one kind or another, until the whole world is more than satiated and turns with relief to such writers as Octave Thanet, who can find more virile and human heroes in the ranks of the illiterate. In the same way painters take a mean advantage of the world and hang upon the line portraits of themselves and of their fellow artists, and, if bronze and marble were cheaper, doubtless sculptors would display the same narrow egoism. Now and then an agreeable expansion of the practice, or system, is made when one artist immortalizes a follower of a kindred craft in return for services of a similar kind, as Herkomer did when he painted Richardson's portrait in return for Richardson's designing the exterior of his house at Bushey Park. In all this vanity architects are at a disadvantage and when one has a portrait painted he or his friends have to pay for it. But when he has a statue erected to his memory it is because he has accomplished something that is held worthy of such honor by more than a small group of mutual admirers. It is not strange, therefore, that so few statues of architects can be found anywhere, and it will be a noteworthy matter if the movement to erect a statue of Charles Garnier results in anything but talk. The few statues or busts that do commemorate the lives and work of architects are usually more or less closely associated with some building designed by them, or form parts of a series of decorations applied to some public building. Thus we have Street's statue in a corridor of the London Law Courts, Barry's in the Houses of Parliament, a bas-relief of Cockerell in St. Paul's, busts of Duban in the École des Beaux-Arts and of Ballu in the Hôtel de Ville, Paris, as samples of the first class, while as representing the second class we have on the latter building statues of Pierre de Montreuil, Mansart, Le Bocador, Gabriel, Viollet-le-Duc and others, and in the portico of the Ufizzi at Florence can be seen statues of Alberti, Niccola Pisano, Giotto and others. In this country the only thing of the kind is the memorial to Hunt in New York, if we omit the bust of Root, which, we believe, was paid for by subscription, and so also is a semi-public memorial. Even of the less conspicuous memorial, the portrait bas-relief, we do not know where one can be found, and we hope that the appeal to the Massachusetts Legislature by the Boston Society of Architects may be listened to and result in the erection of a memorial tablet, with portrait bas-relief, to Charles Bulfinch in the Doric Hall of the State-house in Boston. We do not pretend that many American architects deserve statues nor assume that the public particularly misses their non-existence, but we do believe the public is sick of the trials and tribulations of authors who are the heroes of their own stories, and does not care much to know how painters look when immortalized on canvas by their own or the brushes of their friends.

WE are sorry to note a reported shortage in the supply of Portland cement at Chicago, as a similar shortage may declare itself elsewhere. This is a sufficient evil during the present season and will bear heavily on some contractors; but it forebodes a graver disturbance next year. Every famine begets an oversupply, and not only will imports be large next year, but all the cement works in the country will increase their output and new works will be started, so a glut may be expected and a fall in prices. Fortunately, several brands of American Portland cement are excellent, and it is hard to have too much of a good thing.

ON THE HISTORY OF OUR IDEAS CONCERNING ILLUMINATION.

THE usefulness of a window in illuminating a room is so patent, and the value which our nineteenth century places upon utility is so great, that it is wellnigh impossible for us to picture to ourselves the antipathy which the Greeks and Romans entertained for windows in the sides of a building. This antipathy, however, is very evident, for all the temples of Egypt and Greece combined furnish two instances only of windows within the Classical period, the temple of Apollinopolis at Edfoo and the temple at Agrigentum. Nor is the cause of this dislike far to seek; for, all considerations of taste aside, windows which antedated the invention of glass were little more than holes in the sides of the building.

The Greek idea of a window is fairly represented by the word they employed for it, viz: θυρίς, which is merely a diminutive of θύρα, a door.

It is not difficult to believe that these "little doors," always ready to admit their share of wind and weather, were not inserted in the plans of a building except when absolutely necessary for light or ventilation.

It is a most unfortunate circumstance that practically nothing remains, either in literature or in brick and mortar, of Greek or Roman dwelling-houses or places of business belonging to a period earlier than the beginning of the Christian era. Unbaked brick and timber are materials which do well if they outlast a single generation. It is not surprising, therefore, that nearly the whole of our information concerning the dwelling-house and the business-house of ancient Greece and Italy is obtained from the ruins of Pompeii. The windows here found are few and small and located principally in the second story. In the ordinary private house, any single opening serves the triple purpose of door, ventilation and illumination. The Romans, it is true, used glass in great quantity and for a great variety of purposes, but scarcely ever for windows; only two or three specimens of panes have been found at Pompeii. When we consider buildings more pretentious than private houses, the absence of windows is equally marked; one of the boasted beauties of the Pantheon is its lighting, which comes entirely from a circular opening in the top of the dome. Even in the superb villa of Hadrian, near Tivoli, there appear to have been no windows whatever, the rooms being partly open at one end.

If one turns to Classical literature in the hope of finding there some rational account of the construction, ventilation, sanitation, and lighting of buildings, he meets only disappointment. The notable exception is the Roman architect, Vitruvius. The writings of this one engineer contain nearly all that is known and much, it may be added, that is not known, concerning the best architectural practice of the first century of our era. Never is one so impressed with the utter barrenness of the great bulk of historical literature as when he inquires of it concerning the daily life and habits of any past generation, ancient, mediæval or modern.

But of the lighting of a Roman house we know at least this: that it was secured principally through an opening in the roof near the centre of the building and through the doors. At night tallow-dips and smoky oil-lamps were the two sources of illumination; not much work was done after twilight; not much reading was done at home. A fair statement of the situation is, perhaps, contained in the etymology of the word *atrium*, which in ancient Rome denoted what we might call the living-room of the house. Here the wife and her maidens did the spinning. Here hung the family portraits and other paintings. And yet the room was called *atrium* because it was the "dark" room — from *ater* meaning coal-black, lustreless, — here, probably, lustreless because black from smoke. This state of affairs — even when ameliorated by an Italian climate — would never be tolerable to a *fin-de-siècle* American.

The modern glass-worker is everywhere recognized as a conservative man. And during the mediæval centuries glass-making does not appear to have distinguished itself among other industrial arts by making any marked improvements. Glass windows of small-sized panes, wanting in transparency and with no brilliancy of surface, came into general use in ecclesiastical architecture.

But glass covers a great variety of products. The mere existence of a church window in the Middle Ages furnishes no evidence whatever as to the manufacture of ordinary clear window-glass. It appears that the use of window-glass in France began to be somewhat general as early as 1302; and by the time that printing had been invented and America discovered the use of window-glass in more pretentious buildings, at least, had become widespread over Europe. That the lights were small and the glass still of very inferior quality is evident from the fact that steel mirrors were still in all but universal vogue as late as the sixteenth century.

Glass mirrors appear to have been known from early times, but were not a commercial success until about the time of Shakespeare's birth, 1564, the year in which a great mirror trust was formed among the glass-makers of Venice. During the sixteenth century we may say, therefore, that glass plates reached a fair degree of perfection. How enormously expensive these plates were, when of any considerable size, is well illustrated by an inventory of the effects belonging to the great French minister Colbert. Among the items on this list made at the time of his death (1683) are enumerated a Venetian mirror 46″ x 26″ valued at 8,016 pounds and a picture of Raphael at 3,000 pounds!

Among the Anglo-Saxons the window carried with it no association of glass as it does with their descendants of to-day, theirs being simply an opening in the side of the room covered with a lattice-work or piece of stretched hide, used for the purpose of getting a glimpse of the outside world; it was appropriately called *eagdura*, that is, an "eye door."[1] But the Anglo-Saxon race has never been slow to take hold of a good thing when once recognized. Glass windows and fireplaces were both introduced in the fourteenth century. Within a hundred years windows came into all but universal use, while the fireplace and chimney were more slowly introduced. What an expensive process the making of window-glass was at this time may be gathered from the following story recited in Traill's "*Social England*":[2] "Glass windows were in general use but were very costly, and were accounted so precious that we find, according to the Household Book (1490) of the Duke of Northumberland, that when his Grace left his town residence the glass windows were taken out and carefully laid by until his return." When it is recalled that houses of mud and timber were at this time being replaced by buildings of brick and stone; that wind and weather were being shut out by transparent glass; rushes replaced by floors and carpets; separate sleeping-rooms and pillows coming into vogue; and baths, abandoned during the Middle Ages, again heard of, one is almost inclined to doubt whether the fourteenth and fifteenth centuries were not as remarkable as our own in respect to the rapid development of physical comforts for the individual.

If, now, we imagine the Middle Ages ended, and dwelling-houses and places of business fairly lighted during the day, the next great step in illumination may be described as the beginning of an attack on the darkness of night. It is, indeed, little short of amusing to discover how many times within the last two centuries night has been turned into noonday.

This was first accomplished in England in 1685, when letters patent were granted to one Edward Heming, giving him the exclusive right of lighting London. These "valuable rights" of Heming's consisted in the privilege of placing a light before every tenth door during six hours on moonless nights, and of receiving therefor some financial consideration. The dazzling brilliancy of these so-called "new lights" drew from the contemporaries of Heming much praise for themselves but many sneers and odious comparisons concerning the accomplishments of preceding ages: This brilliant seventeenth century! When a Greek ventured out at night his slave carried a lighted torch before him. But we do not have to carry any candles; we have little tallow-dips at every 500 feet along the streets — except, of course, after twelve o'clock.

From this point-of-view it is interesting to find Macaulay describing the London of his day, just fifty years ago, as "blazing with splendor" compared with the times of Cromwell when these "new lights" were first introduced; while, as a matter-of-fact, if the streets of London, to-night, were lighted as in Macaulay's day, a large part of their traffic and travel would instantly cease. In Paris, street-lamps were introduced a few years earlier, 1667, although as early as 1558 lanterns, or torches made of pitch, were required by law to be placed at each street corner from 10 P. M. to 4 A. M.

This miserable illumination, both public and private, demanded a daily programme quite different from ours. Henri in his "*L'Eclairage à Paris*" describes the streets of Paris as crowded and busy at sunrise. At these early hours the law courts were in session and the public offices open. Parliament met at 6 A. M. and sometimes even at 4 A. M. One dined at 10 in the morning and took supper at 4 in the afternoon. Curfew rang at 8 or at 9 and the whole city became suddenly dark and silent.

The invention of the oil-lamp in 1765 by Chateaublanc won for him a prize of 2,000 pounds from the French Academy of Sciences.

The utter folly of setting any limits to the possible achievements of science — of the human mind, if you prefer — is well illustrated in the following opinion which the Chief of Police in Paris writes to the King, Louis XV, concerning this new oil-lamp: "The light which this lamp yields is such that I think it will never be possible to discover a better." One can easily imagine this same remark made concerning the tallow-dip which, in the eleventh century, was discovered and replaced the smoky Roman lamp.

And doubtless the same comment has been made a thousand times concerning the next great step in illumination. I refer to the discovery of gas by Phillipe Lebon in Paris in 1799, and by Murdock in England in 1798.

The rapid rise and development of gas-lighting is a story so well known that I will not detain you with it. Introduced with the voltaic battery, at the very outset of our own century, these two form the very earliest of those achievements which must render it a most memorable era.

The electric-light, which may fairly be dated from 1876, when the Jablochkoff candle and the Gramme machine were perfected, forms the next great step in the history of illumination. The Edison filament, coming three or four years later, is what some Frenchman has called "*la lumière de luxe.*"

Since 1880 our ideas of what constitutes a satisfactory working light have been quite revolutionized. Among the elements which

[1] Etymologically our word *window* is a compound of *wind* and *eye*.
[2] Vol. 2, p. 572.

have combined to produce this revolution are, at least, the following: the low cost of steam-power, the high efficiency of the modern generator, together with the constancy, safety, flexibility, reliability and healthfulness of the incandescent system.

The next important step in illumination is the introduction of sky light into long and previously electric-lighted or dark rooms, by means of some refracting or reflecting device in the window, such as the Hayward light in England or the greatly improved Luxfer prism in this country.

That its first cost is absolutely zero is not the sole merit of sky light. Besides containing every variety of color in such a proportion as to yield on the average a very white light, it is also a very much more brilliant source than is generally believed. But as an illuminant for working-purposes one of its decided advantages is that it comes from an infinity of different directions, so that, even when limited by neighboring buildings or window-frames, it still casts shadows which are few in number and never deep.

The simple and elegant device by which this light is being rapidly introduced into many dark rooms is already well known to architects, being merely a sheet of glass prisms, with refracting edges horizontal, and faces set at angles appropriate to the circumstances of each particular building.

Such, briefly, is the history of twenty centuries of lighting; the outlook for the future forces itself upon our attention. The keen interest which attaches to the prospects of any department of learning is eminently "natural." But the careful student of science early learns to limit his predictions to those which are based upon rigid mathematical deduction, or to distinctly label his predictions as mere guesses.

If one may be allowed to indulge in this latter form of prediction, it might be said that, in the future, the architect will be increasingly called upon to give more attention to questions of illumination, that sources of illumination will become more and more numerous and scattered, perhaps by using smaller units, perhaps by using surfaces such as windows backed by sky light during the day and brilliant Geissler tubes at night, in this manner completely banishing shadows.

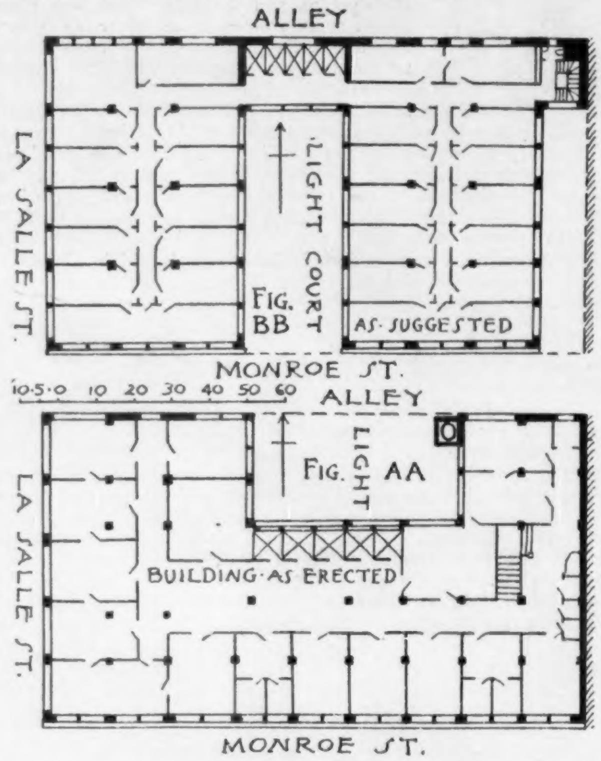
One source of great danger in fighting fires at present is the falling of broken glass: there are reasons for thinking that this danger too may be materially lessened in the near future.

HENRY CREW.

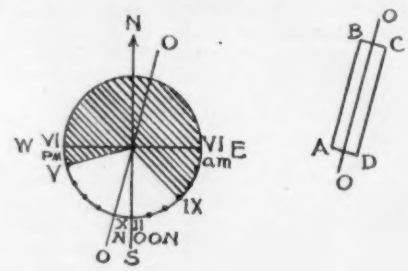
INTERIOR LIGHTING.[1]

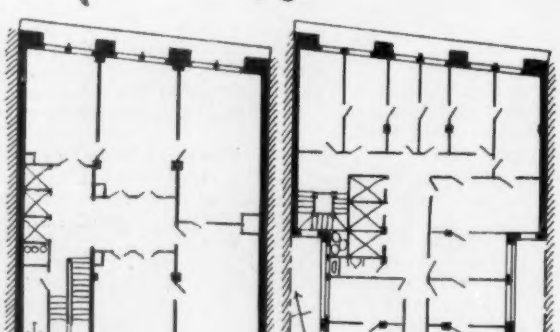
THE treatment of light, or the proper distribution of daylight to any building, is of greater importance than anything else, except, perhaps, drainage, and daylight assists largely in the sanitary conditions and cleanliness of all buildings, whether offices or warehouses. It is a common saying that "dirt cannot stand light," and when it is borne in mind that daylight is available to all and costs nothing, it is a great pity not to utilize it to the utmost extent, and this should be done by covering any particular site so as to obtain the best result from the open air and direct daylight, and to assist the same by the use of artificial means or devices, such as reflectors, pavement-lights, etc. Daylight necessarily is brought in through the windows, and the light that enters the room falls on the floor at an angle up to about 45 degrees, where it is nearly all absorbed, and consequently does not produce the full effect that is required for all offices. The arrangement of windows, of course, lends itself to assist or detract from the result obtained, and it will be found well to keep the head of the window as near the level of the ceiling as possible; at any rate, not to be more than 12 inches below it. The lower part of a window is practically of little effect if brought within two feet of the floor level. The window should be placed so as to give an equal margin of wall on either side as nearly as possible, and the length of an office should not exceed about twice the height of the head of the window from the floor, which in the ordinary way would be a limit of about 16 feet to 20 feet. The general depth of an office should be taken about 16 feet, as beyond that distance light is not good, and the extra space loses value; and there is a point where the extra size or depth can only uselessly increase the size of an office and not produce its proportion of rent.

A useful rule for the size of windows is, that not less than one square foot for every 85 feet of cubic space, and not less than one square foot for each lineal foot between the window and opposite wall inside should be given. Of course, all such rules would be varied by circumstances, as to whether on the ground, first, or any other floor, and also from what direction the light can be obtained. And generally the height of a window may be half the depth of a room less two feet, and the width of a window one-third the width of a room. Good, pleasant daylight is of the first importance, and there is a general difference of opinion as to the proper aspect for this. Some hold that only the north light is good, while others that no building is well planned that is not so arranged that there is a little sun in each room during a part of the day. The latter opinion is certainly the best; and, although this is a difficult problem when the irregularity of the streets and frontages in most towns, and the height of adjacent buildings near are so very variable, under all circumstances it is better to lay down what is the best direction for the daylight to reach the windows on any site, and this of course can be more readily arranged on a fairly rectangular site.



The first point to decide is the best axis for the open areas or well openings. Take the average day, and suppose the sun rises at six (see diagram, below), vi.E. will equal 6 A.M., and vi.W. will be 6 P.M. The usual hours of business are, say, from 9 to 5, and then the angle, v. ix, if bisected, will divide the hours of sunlight equally, and it is this line which should rule the direction of the greater length that open areas and well-holes should have. This will be found to be 15



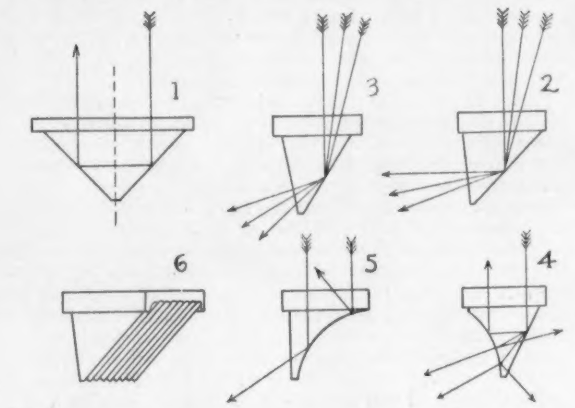


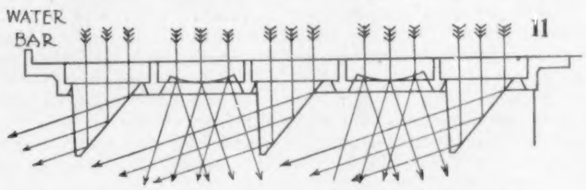
degrees east of north. The open area or court should be made rectangular, not square, and lengthways, north and south. If the line O O be taken as 15 degrees east of north, a well-hole should be formed as A B C D. A portion of sunlight (every day that the sun

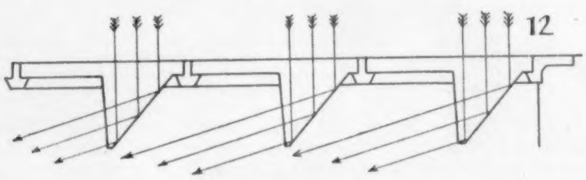
[1] A paper by Mr. W. Eckstein, read before the Architectual Association, London, May 6, 1898.

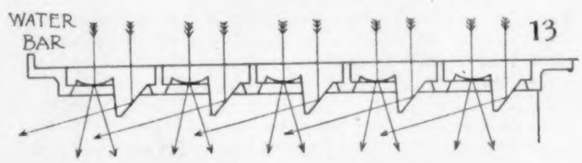
is visible at all) would go into all the windows in the walls, A B, B C, C D, during each day, and in some seasons reach the bottom of the well-hole, and, at any rate, it would reach the maximum distance at all times.

If you have followed this proposition carefully you will at once see that if in any town the roads have this direction of 15 degrees east of









north, and the cross-roads at right angles to them, there will be a great advantage. This is not often to be gained, but it has been noted that this happens to be near the prevailing direction in New York City, and the advantage must be considerable, although it will not be apparent to many.

Following up the proposition of the proper axis for open areas for obtaining the best and most useful daylight to buildings, I have taken the two sets of drawings and following remarks from the "*Architectural Record*," December, 1893, and June, 1894.

The conditions for a successful building for use as offices are:—

I. Ease of access.
II. Good light.
III. Good service.
IV. Pleasing environment and approaches.
V. Maximum rentable area consistent with economy.
VI. Ease of rearrangement to suit tenants.
VII. Minimum cost with true economy.

The plans A and A A show two buildings as erected, and B and B B as it is suggested they should be.

For good light, experience confirms the statement that courts should have their long axis north and south. In the plan A it will be seen that the court is of irregular shape, but with the long axis east and west, and while the court area embraces 150 square feet more than in the plan B (as we say it should be), yet its service in lightings is decidedly less. The rentable area in B is apparent, and the fact that it is possible to have fourteen different tenants on each floor, instead of five, as in A, is a consideration which would enhance the value of the building, if erected as suggested. The arrangement in the plan B gives an area of 220 square feet, or about 10 per cent. more than in A. The other illustrations in comparison are made on the drawings A A and B B.

As to the arrangement for good light, it is generally accepted that the requirement is that every portion of the office should be within 20 to 25 feet of a window, and that that window should not open directly to the south. It is to be hoped that the disadvantages due to the direct south light to an office will soon be appreciated, and the advantage of a court or open area, with its long axis north and south, more fully understood. Offices, on a bright day, facing to the south have to have the blinds partially closed in order to reduce the glare from the sun, the consequence being that the back portion of the office has to be lighted, possibly by gas or other means. The corridors in the plan B B, as suggested, would be sufficiently light with glass in the doors, and fan-lights over.

The comparison of these two sets of plans, showing buildings as erected and suggested, are presented as having a considerable bearing on the matter under discussion, and is also a subject in which architects in particular are greatly interested.

Upon valuable sites where the amount of available daylight is very limited, it is necessary that the least possible space be appropriated as mere open areas for light. To show the difference of opinions on this matter, Mr. Boult, of Liverpool, compiled the accompanying table, which speaks for itself, comparing the different areas so appropriated in five different competitive drawings submitted for the new Stock Exchange, Liverpool, about fifteen years since.

The plot was 49 feet to Dale Street, depth 197 feet, back width 36 feet, and the total area 9,195 feet, the only street outlet being Dale Street.

COMPARISON OF SPACE SACRIFICED FOR LIGHT.

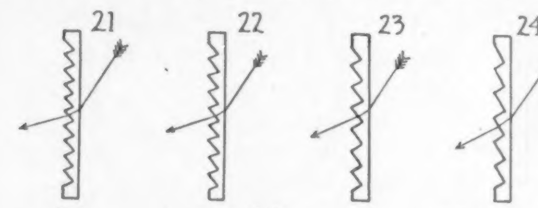
Designs.	Basement.	Ground-floor.	First Floor.	Second Floor.
Argus.........	323 ft. 1 in 28.4	570 ft. 1 in 16.0	1,030 ft. 1 in 8.9	1,950 ft. 1 in 4.7
Grand Trunks.	None.	4,121 ft. 1 in 2.2	4,121 ft. 1 in 8.2	4,121 ft. 1 in 2.2
Shamrock. ...	45 ft. 1 in 204.3	260 ft. 1 in 35.3	1,822 ft. 1 in 5.0	3,097 ft. 1 in 3.0
Coupon........	None.	390 ft. 1 in 23.5	2,283 ft. 1 in 4.0	2,213 ft. 1 in 4.0
1877...........	None.	1,186 ft. 1 in 7.75	1,380 ft. 1 in 6.6	2,859 ft. 1 in 3.2

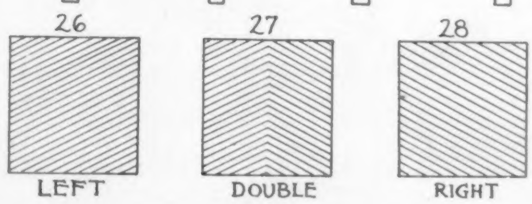
It may also be useful to compare the rent-producing area shown:—

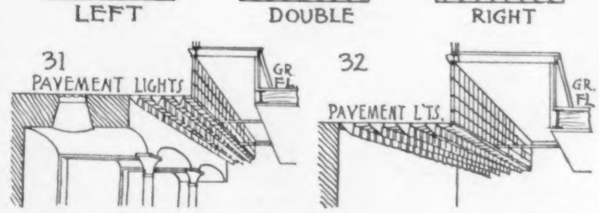
RATIO OF SPACE YIELDING RENT TO THE WHOLE AREA OF SITE.

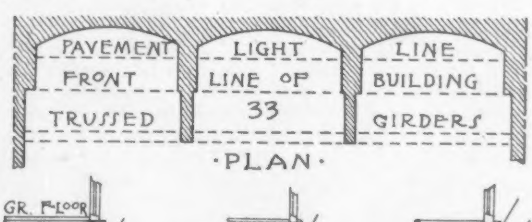
Designs.	Basement.	Ground-floor.	First Floor.	Second Floor.
Argus.........	1 in 3.9	1 in 2 32	1 in 1.88	1 in 2 14
Grand Trunks.	1 in 1.6	1 in 1.26	1 in 2.23	1 in 1.70
Shamrock.....	1 in 2.24	1 in 3.0	1 in 1.94	1 in 2.60
Coupon........	1 in 1.76	1 in 2.30	1 in 1.75	1 in 2.35
1877...........	1 in 1.9	1 in 2.97	1 in 1.66	1 in 1.54

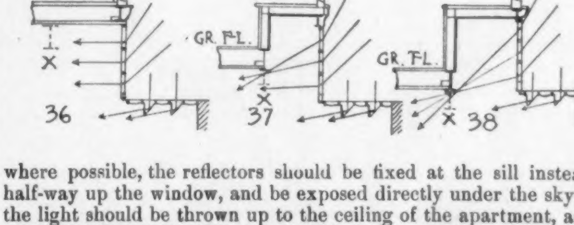
Notwithstanding the proper arrangement of well-holes and light openings in the lower floors, it is necessary often to assist the daylight by reflectors. These are so generally known, and their good effect so considerable, that it is only advisable to point out that,







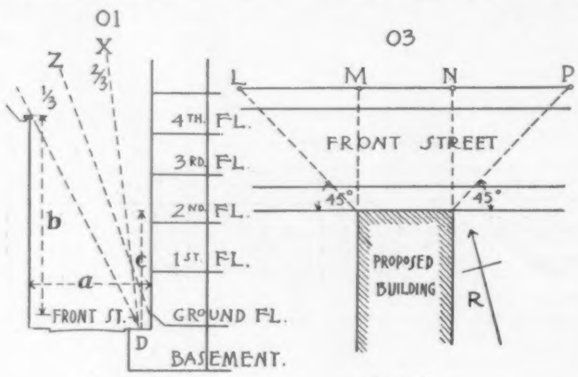




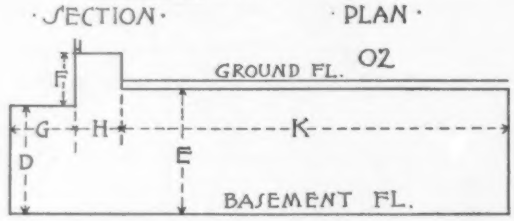
where possible, the reflectors should be fixed at the sill instead of half-way up the window, and be exposed directly under the sky, and the light should be thrown up to the ceiling of the apartment, and if this is polished in hard plaster it will greatly assist to distribute the light throughout the room. Where volume of light is required direct, light should be admitted vertically. The light passing through a skylight is very much greater than that through any vertical window, and consequently the light received from the horizontal pavement light is much stronger than from a vertical stall-board.

It is hardly necessary to dwell on the difference of reflection and refraction, but it should not be overlooked. All rays of light move in straight lines, and when they strike upon any object they glance off its surface, are wholly or partially absorbed, or pass through the object as in a sheet of glass or a body of water. In the first place, the light is said to be reflected, and in the others refracted, because its course is partially diverted from the right line in which it left the luminous body, and its direction bent or broken back according to the difference in density between the two media. A common illustration of this is the contortion of a stick partially immersed in water, or a coin placed at the bottom of a bowl, so that it is partially seen over the edge, and when the bowl is filled up with water the coin will come into full view from the same point.

The direction in which light is reflected depends upon that from which it proceeds; it is always such that a perpendicular to the surface at the place of impact bisects the angle formed by the arrival and departure of the ray. Each half of the angle represents the angle of incidence or the angle of reflection; those angles are always



·SECTION· ·PLAN·



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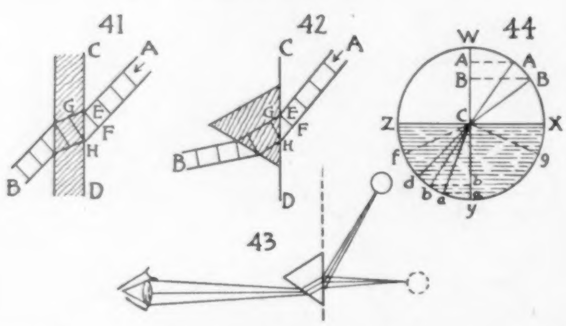

equal, and always in the same plane, one being known, the other is readily ascertained.

The perpendicular is termed the axis of incidence, the first ray the incident ray, the other the reflected ray. It is by the reflection of the rays impinging upon them that objects become visible, and the reflective powers of the objects are very variable. At a perpendicular incidence, water reflects only eighteen rays out of every 1,000 and glass only twenty-five, while mercury reflects 666. When the rays strike the surface obliquely the reflection is augmented; at an incidence of 40 degrees water reflects twenty-two rays, at 60 degrees, sixty-five rays, at 80 degrees, 333 rays; while at an incidence of $89\frac{1}{2}$ degrees, where the light almost grazes the surface, it reflects 721 rays out of every 1,000.

Thus as the obliquity increases the reflection of water approaches and finally overtakes the reflection from mercury, but at no incidence, however great, is the reflection from water, mercury or any other substance *total*.

Any beam of light meeting any refracting surface obliquely, it is obvious that one part of the beam will meet it before another; it is thus hindered in its motion by it as wind is hindered, but not stopped, by the trees. Trace a ray A B (Fig. 41) to the refracting surface C D, marking off the assumed length of its waves by the transverse lines. The front will be retarded at E before it is retarded at F, and we may assume the retardation is such that the wave in the denser medium is only propagated to G, while in the rarer medium it reaches H. It is plain that the beam must swing round, but when the side F also reaches the denser medium at H the whole will be retarded alike, and the beam will proceed as before, only slower and in a different direction. As the beam emerges from the denser medium the reverse of what has been described occurs, and, provided the refracting medium is of uniform density and thickness, the beam of light proceeds in a path parallel with its former course. In lenses and prisms the emergent beam takes an oblique path, and in the case of lenses either convergent or divergent (according to the kind of lens) and the position of the lens relative to the object.

In Figure 42 the upper side of the beam of light is still further retarded, and therefore the beam must swing round again and pass out in quite a different direction to that of entry, so that a beam of light passing through (a prism) is permanently deflected. For example (Fig. 43), the sun viewed through a prism, as shown, will appear to the observer in a lower position; the light in this case is twice refracted — once on entering the glass and again on leaving it.

The principle on which the measurements of refraction are based was discovered by Willebrod Snell, and is explained as follows: —

Let W X Y Z (Fig. 44) represent the outline of a circular vessel containing water, and X Z the surface of the water. When the ray is incident along W C, perpendicular to X Z, it is not refracted, but reflected on the same line; when it is incident along A C, it is refracted at C, and strikes the circle at *a;* when it is incident at B C, it is refracted to *b.* From the ends of the incident rays let A A and B B be drawn perpendicular upon W Y, and from the ends of the refracted beams let the perpendiculars *aa* and *bb* be drawn. Measure the lengths of A A and *aa*, and divide the one by the other, and there is a certain quotient. Divide B B by *bb* and they give the same quotient — that is, the ratio between the sines of the angles of incident and the sines of the angles of refraction is constant. Snell found this quotient to be a certain quantity for each particular substance, though it varied in amount from substance to substance. He called the quotient the "index of refraction."

According to Brewster, the index of refraction is —

For glass, two of lead to one of flint	1.830
Plate-glass	from 1.514 to 1.542
Crown-glass	from 1.525 to 1.534
Water	1.336

In comparing the lenses used in pavement lights I assume the index to be 1.5; therefore the angle of refraction, on entering glass from the atmosphere, is two-thirds of the angle of incidence, and on leaving the glass it is half as large again.

Referring now to the lenses and prisms that are most useful in pavement-lights and stall-boards, shop-fronts, offices, windows, etc., the first kind of glass probably used in decks or floors was undoubtedly the common "ship's deck-light," which is a solid mass of glass with a flange all round to support it in the adjoining floor, and with a heavy drop or triangular wedge on the under side. Whether this drop was originally intended for strength, or for increasing and distributing the light, is doubtful; there is no doubt about the strength, but if you look at the lens on the diagram (Fig. 1) it will be seen that all the vertical rays are reflected outward again from the sloping faces on either side.

We now take practically the same block of glass (which for our purpose is cut in two) and open it outwards, and you will at once see the marvellous result, and it is this principle which has been the foundation of "Haywards' patent semi-prism pavement-lights" (Figures 2 and 3). It will be seen that the vertical, or nearly vertical, ray is thrown out through the upright, or nearly upright, front of the lens at an angle a little below the horizontal, and the rays falling on the top of the lens at various angles (Fig. 2) are thrown out in a fan shape, and the steeper the back slope, with the nearly upright face a little more inclined (as in Fig. 3) projects the light lower than in Figure 2. Of course, such an important result, which can be obtained from a series of prisms grouped in a frame as a pavement-light and protected by a patent, has been attempted by various other devices or sections of lenses, as in Figures 4, 5 and 6. These are lying on the table, and the average result can be got by holding them in the hand and comparing one with the other. The result is generally bad, and that the makers of such lenses should have been given a certain amount of encouragement by architects using them shows to a certain extent the comparative neglect in deciding such an important matter as to which is the best kind of pavement-light for producing the best illuminating effect in any building. It will be seen, too, from Section 11 that some thought is required in assembling the lenses in a properly-constructed frame, so as to produce a satisfactory result.

Section 12 is an attempted improvement on Section 11, but, unfortunately, there is a great difficulty in making such irregular shaped lenses perfect, when one part is so bulky and another so thin, on account of the inequality of the glass and tension in the lens, therefore this lens in practice is a failure. This tension also limits the size that can be safely made.

Figure 13 is a neat arrangement of a small prism in each pocket, and may be often of use when the area of pavement-light can be large.

Now, coming to the vertical lights used in stall-boards, or applicable to shop-fronts, windows, etc: The lenses used are "Haywards' reflecting lense" (as in Figs. 21, 22, 23, 24), which are made at different angles to suit different circumstances. Such lenses are usually employed under the shop or office front, and the application is better explained in Figures 36, 37, 38.

In plan Figure 33 and Sections 31 and 32, the combined arrangement of pavement-lights and stall-boards will be clearly understood. It should be noted that if any girder be introduced (as shown in dotted lines x, x, x in Figs. 36, 37, 38) a very considerable portion of the light would be lost, and a heavy shadow would be cast along the ceiling. Pavement-light should be supported by bearers transversely, and as little obstruction or thickness of metal be introduced at the junction of the vertical stall-board with the horizontal pavement-light, and this is easily arranged by turning up the back edge of flange as shown in Sections 11 and 13, which is generally called a "water bar."

Fifteen years ago Messrs. Hayward Bros. fixed in two fronts of the ground-floor premises, used as offices, etc., Haywards' reflecting stall-board lights. The result is very effective, and the light often too strong; in fact, it is necessary to place the desks so that the clerks do not face the front light. These lenses can be applied in various other positions, as in lean-to or sloping roofs, etc. The frames of the upright or stall-board lights are sometimes made with rebates to the horizontal bars only, or vertical bars only, and in others with a perfectly plain sectional bar without any rebate, with a small button at the intersections to retain the glasses in their position.

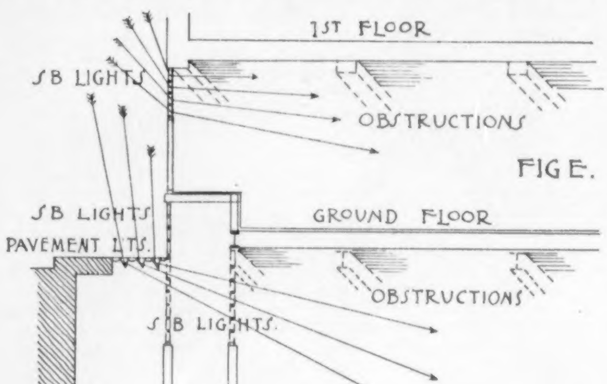

FIG E.

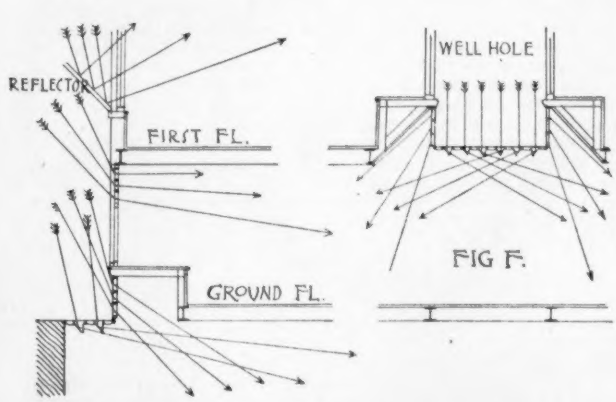

FIG F.

Diagrams E and F are general sections of a basement and front, in which it will be seen that a combination of several devices, as already more or less explained, can be introduced to such an extent, either single or combined, as may be desired. It will be seen that the upper portion of the windows can be glazed with the reflecting stall-board lenses, to throw the light to the back portion of the ground-floor in almost a horizontal direction, or to throw the light slightly upwards on to the ceiling and thereby illuminate the back portion of the office. In the diagram (E) it will again be seen the great disadvantage of running any transverse girders or beams below the level of the ceiling across the direct line of light; these girders or beams would throw heavy and objectionable shadows, so that the ceiling, instead of being light and bright, would be shadowed and the major portion of the reflected light lost. Under the stall-plate stall-board lights can be fixed vertically, as in the window above, and in the pavement-light "Haywards' Semi-prism Lenses," fixed horizontally, and these pavement-lights could throw the light on to a stall-board light fixed as shown when a partition is advisable to divide off the front part of basement, and this would throw a volume of light into the basement.

In the other sectional drawing, F, the ordinary daylight reflector is introduced at window-sill on first floor, and near the middle of the depth in well-hole a series of pavement-lights and stall-board lights to throw the light all round same are introduced; the arrangement of lenses throwing reverse ways should be noted. It will be seen that one or two of these plans can be adopted with more or less advantage.

Many modifications suggest themselves to architects and others, and with the information called for in diagrams 01, 02, 03, the best arrangement can readily be worked out.

It will be noted that when light is obtained from definite sources it must be taken to act in some line of greatest volume, and, referring to the diagram 01, the best light falling on the pavement-light at "D" will be at about one-third of the angle made by the front of the building, and the line of light from the coping of the opposite building, or in the direction "X," and from the stall-board lights at about two-thirds, or as direction "Z."

Again, if the street is very narrow and a high building directly opposite, the light can be usefully assisted by such lenses as Figures 26, 27 and 28.

In all cases, the tops of the lenses of pavement-lights and front of stall-board lenses should be plain flat surfaces and kept clean. However, ornamental effects can be given, but this is generally done with a proportionate reduction or waste of light. Also, a more ornamental appearance can be given by tile inlays between the lenses of pavement-lights, or a good foothold by a non-slipping material, such as lead, cement, facing, etc.

Specimens and samples of such lights are numerous and difficult to show to advantage away from the factory, on account of their weight, and also because they cannot be seen in position.

In conclusion, I would add that an effective result can only be produced with the fullest information being supplied, as in the diagrams 01, 02 and 03. The conditions should be carefully examined, so that every advantage may be taken to fulfil the particular result desired.

THE ILLUSTRATIONS

[Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.]

THE BILLIARD-ROOM: CLUB-HOUSE OF THE GENESEE VALLEY CLUB, ROCHESTER, N. Y. MESSRS. DU FAIS & CANFIELD, ARCHITECTS, NEW YORK, N. Y.

[Gelatine Print, issued with the International and Imperial Editions only.]

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ALTAR AND REREDOS FOR ALL SAINTS' CHURCH, WORCESTER, MASS. MR. HENRY VAUGHAN, ARCHITECT, BOSTON, MASS.

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FRONT OF THE CATHEDRAL, ZACATECAS, MEXICO.

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THIS plate is copied from *La Construction Moderne.*

A GROUP OF DOORWAYS.

ROMAN CAMPANILI.

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THE SAME BUILDING AFTER ERECTION.

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THE GUARDIAN ANGELS' CHURCH, MILE END, EAST, LONDON, ENG. MR. J. H. EASTWOOD, ARCHITECT.

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NOTES AND CLIPPINGS

Turf Briquettes in Germany. — Consul Powell, of Stettin, in his last report, calls attention to a briquette factory at Langenburg, Pomerania, which is somewhat of a new venture, as it has only been in existence for two years, but has proved so far a complete success. It is the Consul's opinion that proprietors of turf moors in Scotland and Ireland might start factories of a similar nature with profit. The owner and manager of the factory has taken a patent in England for his machinery; it could, therefore, be employed either by purchase or by royalty. The turf at Langenburg is cut from the adjacent moor and is brought by water in an undried condition, and can be used immediately. The turf on coming from the moor is thrown into the first breaker-machine, somewhat in effect like a large turnip-cutter, and in this it is broken into small lumps. From the first it passes to the second breaker, and is ground into mull or a fine powder. From here it goes into the drier, a steam-cylinder which is filled with the exhaust steam from the engine, and is perforated by tubes much in the manner of boiler-tubes, but larger. This cylinder revolves, and being on a gentle slope, the mull passes slowly through the tubes and by this means becomes thoroughly dry. From the drier it passes to a hopper which feeds the plunger. This plunger receives the power of a 75 horse-power engine, and by pressing the mull in a form against the preceding briquettes pushes them forward each stroke the width of a briquette. The factory turns out 80 briquettes a minute, or 35 tons per day, with an average output of about 255,500 centners (12,775 tons) a year, and the demand is far greater than the supply, the reason for this being that the briquettes are so marvellously cheap — an average price being 6½*d.* per 130 briquettes, or at the rate of something like two briquettes for $\frac{1}{10}$*d.* retail — that this is certainly the poor man's fuel, as they burn slowly and give a fairly good heat. In a closed oven one briquette will remain in a glowing state for 24 hours; in an open grate it burns more quickly, but remains for a longer time alight than any coal, giving a good red heat. The cost of working is comparatively light, as but few men are required to attend to the machinery. The cost at Langenburg of material and working one centner (112 lbs.) is 35*pf.* (4½*d.*), and per ton about 7*s.* With a more extended plant, the owner of this factory is of opinion that this could be reduced to 5*s.* per ton. — *Journal of the Society of Arts.*

Joseph Bonomi. — He was born at Rome in 1739 and studied architecture under the Marchese Teodoli. In 1767 he was invited to England by the brothers Adam, and was for many years employed by them as an assistant and architectural draughtsman. The acquaintance which he formed in London with Angelica Kauffman, then in the zenith of her fame, led to his marrying her cousin and ward, Rosa Florini, in 1775. When Angelica returned to Italy, after her marriage with Zucchi, the painter, she induced Bonomi to do the same, and he left England in 1783, taking with him his family of three young children; but he did not remain in Italy above a year. About five years after his return, in November, 1789, he was elected an Associate of the Royal Academy, but was never raised to the rank of R. A., although Reynolds interested himself very warmly in his behalf, and did all that he could to obtain for him the professorship, which was bestowed on Fuseli. Bonomi died March 9, 1808, leaving a widow and six children, the eldest of whom also practised as an architect; and another son was known as an authority on Egyptian antiquities. Bonomi's chief professional works were additions and alterations at Langley Hall, Kent, 1790; the chapel of the Spanish Embassy, near Manchester Square, London, 1792; Eastwell House, Kent, 1793; the pyramidal mausoleum in Blickling Park, Norfolk, 1794; Longford Hall, Salop; mansion at Laverstock, Hants, 1797; mansion at Roseneath, in Dumbartonshire, for the Duke of Argyll, 1803, which is his most celebrated work, although chiefly remarkable for the heresy, if not the solecism, of an entrance-portico with a column in the centre. The reason assigned for this caprice is that, as the portico was intended for carriages to drive through, it was thought a column in the centre of the front would express its purpose better; yet, besides having a most awkward effect in itself, a column in that situation is not a little objectionable, on account of its obstructing the view from the entrance-door. Nevertheless the design is praised as displaying originality of genius. Bonomi also made designs for the new sacristy of St. Peter's at Rome, of which edifice he had been appointed honorary architect in 1804. — *The Architect.*

Work on the Panama Canal. — "Although there is not much talk about it in the newspaper, the construction work now in progress on the Panama Canal is on a scale of magnitude which will bring the enterprise to a successful issue," said Mr. B. L. Hewson of the Isthmus of Panama to a *Post* reporter. "There are now over 4,000 men employed on the canal, and the work is being done in a thorough and scientific fashion. Had the first company proceeded as carefully as the present one is, the canal would have been in operation long ere this. The Canal Company owns the Panama Railroad, which runs across the Isthmus, but the active management is in other hands. All the officers of the road and higher employés are Americans. It is a broad-gauge road, forty-seven miles in length, and of recent years has done a heavy business. Its passenger tariff is the highest in the world, as the charge for taking one over the route is $20 in gold, or almost fifty cents per mile." — *Washington Post.*

The Towers of Notre Dame, Paris. — Students of architecture have often wondered why the two towers of Notre Dame are not of equal size, though they appear so to the casual observer. A writer in one of the recent English magazines has found the explanation, which is rather curious. It appears that when the cathedral was built the cathedral of a suffragan bishop was not entitled to two towers of equal size, and for centuries the bishop of Paris was suffragan to the bishop of Sens. — *Boston Transcript.*

Watts's Hers. — In his notes from his diary, recently published, the Rt. Hon. Sir Montstuart E. Grant Duff makes mention of the fact that in his early manhood he was elected to the Cosmopolitan Club in London, which met then, and meets now, in Berkeley Square, in a huge room which was once used as Watts's studio, and on the walls of which there is an enormous picture by him from Theodore and Honoria, in which there are many female figures. Some one asked Lord Houghton what this represented. "Oh," he replied, "you have heard of Watts's Hymns! These are Watts's Hers." — *Boston Herald.*

Falguiere's "Resistance." — A certain French regiment, in the winter of 1870, contained three sculptors — Chapu, Falguière and Moulin, as well as the military painter Philippoteaux. One day the three sculptors were on guard, after a fresh fall of snow, and some one suggested making statues of snow. Falguière produced a figure which he called "Resistance," which he especially admired. Gautier described it in his best prose, Banville wrote a poem about it; but all this would not keep the snow from melting. Lately something has brought back to the artist's mind those days of army service, and he has modelled again — this time in clay — a figure of "Resistance," which will be carved in marble. — *Boston Transcript.*

The Flagstaffs in the Piazza di S. Marco. — Apropos of the well-known flagstaffs in front of St. Mark's at Venice, designed by Alessandro Leopardi. It is an interesting fact, not always noted, that the centre one is not placed upon the axis of the cathedral, but midway between the campanile and the clock-tower. The idea seems to have been that the cathedral could take care of itself and that the soaring flagstaffs needed to compose with the flanking features of the piazza. It is also interesting that they are not at equal distances from the stylobate of the cathedral. The southern one by a rough computation is twenty-three paces distant, the northern thirty-five. The result is that from all the points at which you are likely to view them, all three are visible. This fact is surely an excellent example of the spirit in which the men of that day worked, seeking their chief justification in what seemed most fitting and beautiful. — *N. Y. Evening Post.*

Destruction of a Crusader's Castle near Constantinople. — Every one who is interested in archæology, in architecture, and who entertains any veneration for the hoary past, will share the indignation which has been created in Europe by the news that the Sultan, in order to construct a stone pier at Haifa for the landing of the German Emperor and Empress when they visit the Holy Land a few weeks hence, has torn down the superb Crusader castle, distant about twenty miles from Haifa, for the purpose of using the hewn stone of which it is built. This castle, a grand old pile, erected by the Knights Templar during the Crusader kings' reign over Palestine, was in such a good state of preservation a few months ago that many of the stone-arched rooms and halls were in actual occupation. The vandalism perpetrated in thus destroying this landmark, familiar to most tourists in the Holy Land, is on a par with that which led the builders of the Suez Canal to use for the lining of the Mediterranean entrance exquisitely carved stonework brought from the ruins of Famagusta, that priceless gem of old Venetian cities. — *Marquise de Fontenoy.*

Bounty for Tree-growing. — There is a new law on the statute-books of Pennsylvania which ought to have a wide circulation. It is "An Act for the Encouragement of Forestry." This law takes the best means possible to encourage owners of land to preserve and propagate timber-trees, for it allows a reduction of taxes to the owner of forest-land which comes up to certain requirements of the act. The first man to take advantage of the new law is an Allegheny County farmer, Mr. Tenner of Leet township. As told by the *Pittsburg Chronicle-Telegraph*, Mr. Tenner has obtained from the County Commissioners a reduction of $22.50 on his taxes for complying with the provisions of the law. It is rather remarkable that the second county in the State in point of population should be the first to pay a bounty for forest preservation under the new law, but such is the case. The land-owner who preserves his woods not only gets this immediate reward, but the increasing value of the trees will make a further and larger profit for him eventually. — *Buffalo Commercial.*

Washington's Gift to Alexandria. — The notice in the *Sun* of the large amount which had been realized by Boston upon £1,000 given by Franklin to that city in 1798 has led to a comparison of the work done there with the work done here by £1,000 left by Washington to support a free school in Alexandria. Franklin left £1,000 each to Philadelphia and Boston as a fund to assist young mechanics to enter business. Washington in 1785 invested £1,000 Virginia currency to aid in the education of the sons of widows or other indigent persons in the town of Alexandria. Both funds have now been in operation for over a hundred years. According to the published statement, Franklin's fund has realized $500,000 for the benefit of Boston. Washington's fund has led to other investments and the continuance of free schools in Alexandria for 113 years, and as the result of it about 10,000 children have been educated up to 1871, and since that time at least 1,000 children per annum, increased at this date to about 1,800 children per annum, have had free tuition. One fund was put at one kind of interest, the other at another kind of interest. It would be a problem to determine which has been more effective. — *Baltimore Sun.*

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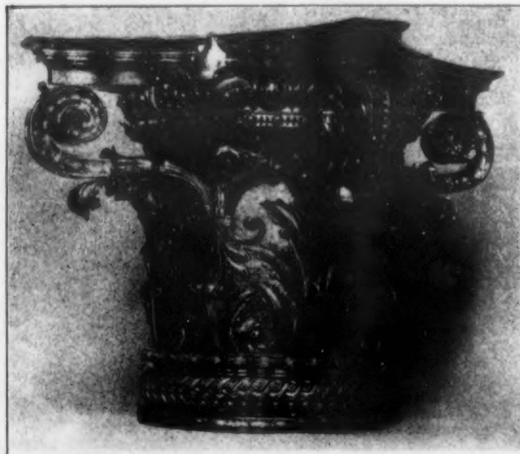
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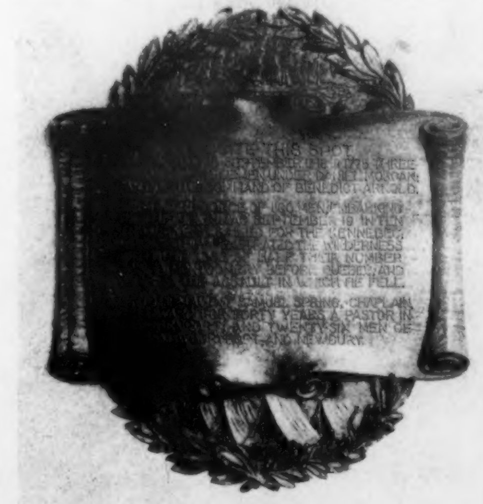


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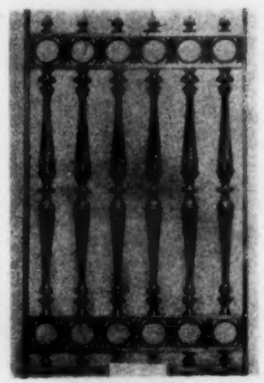
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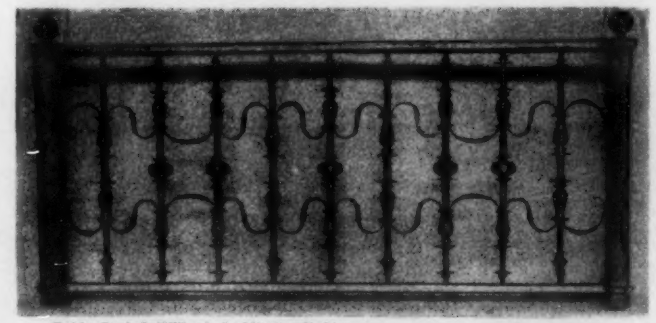
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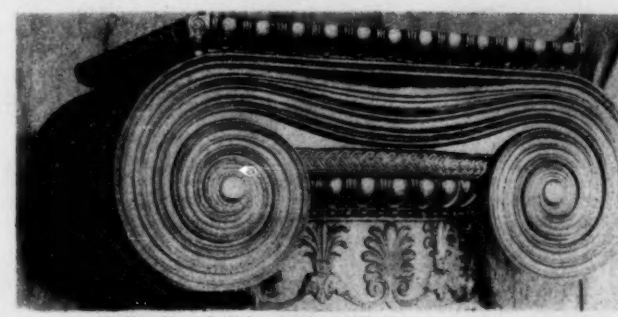
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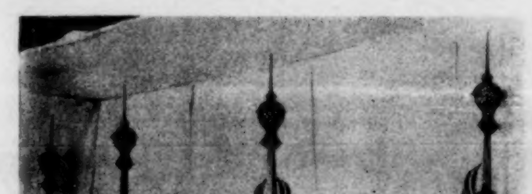

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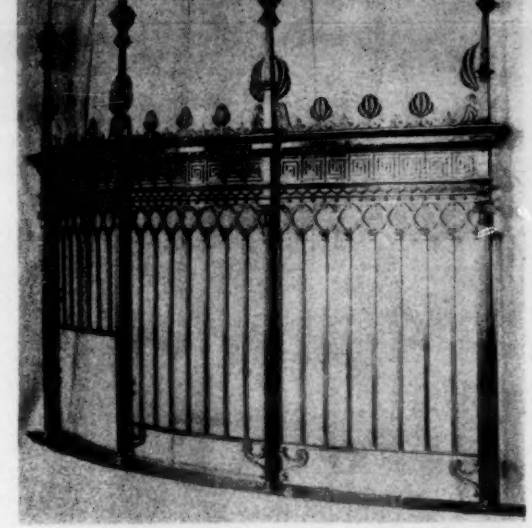

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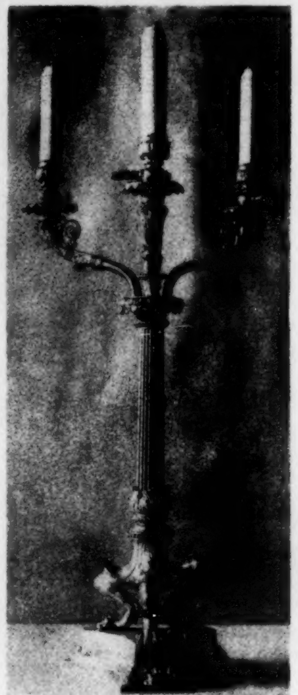

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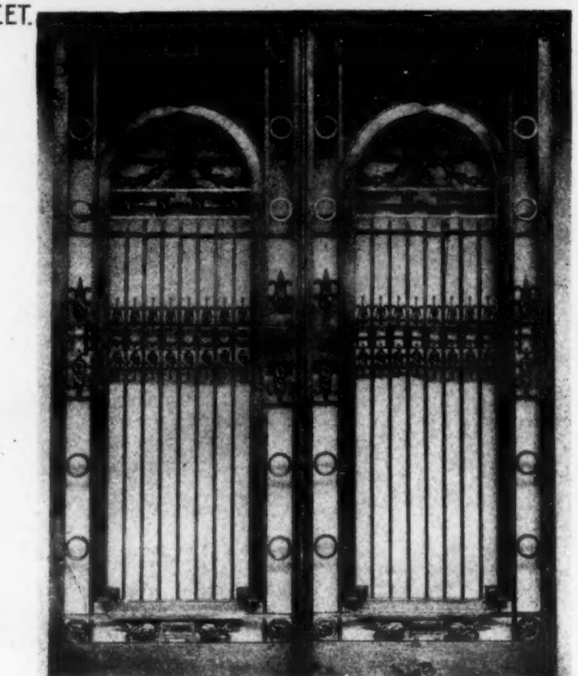

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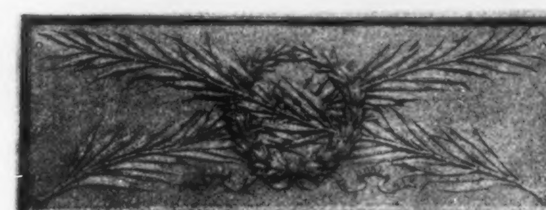

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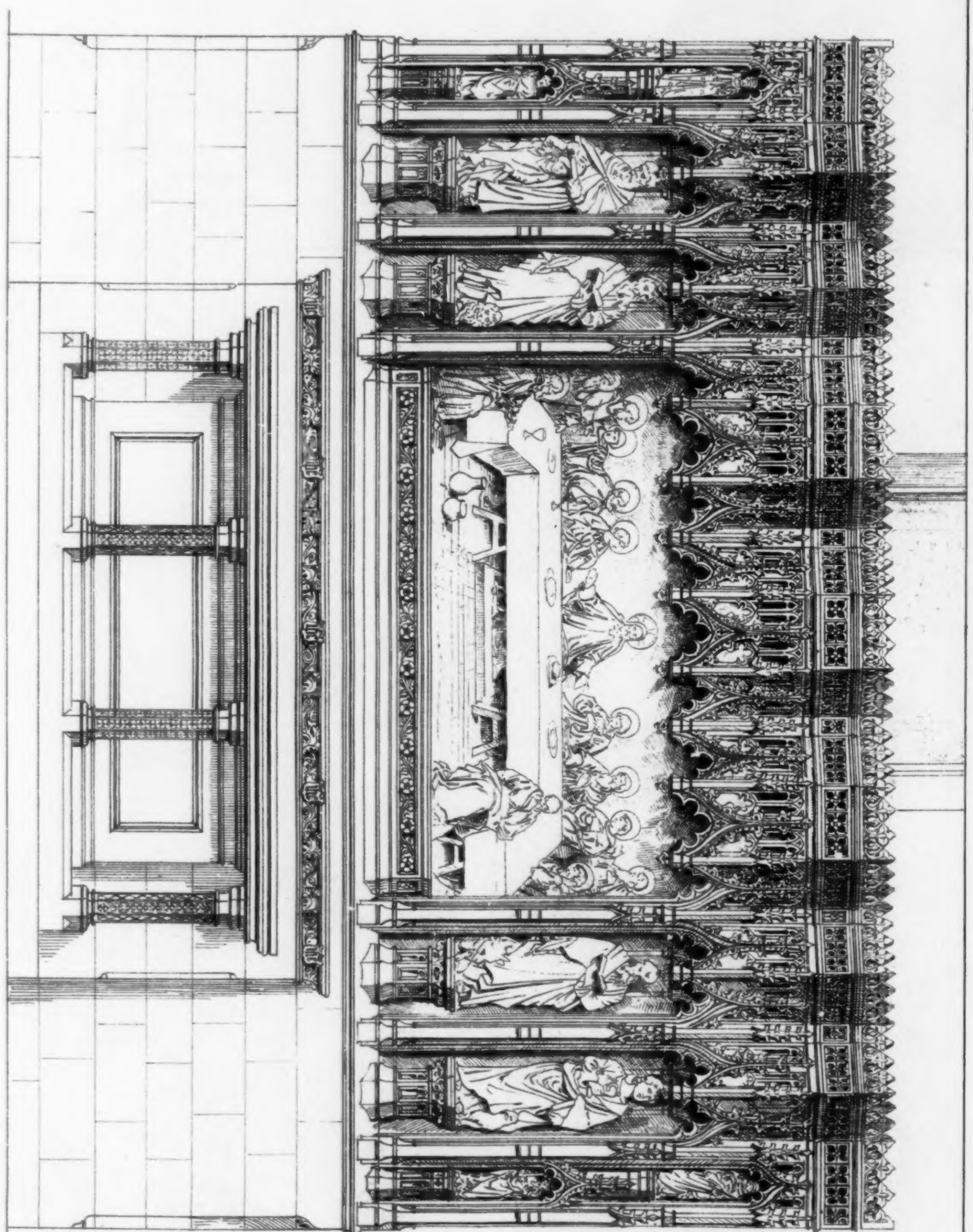

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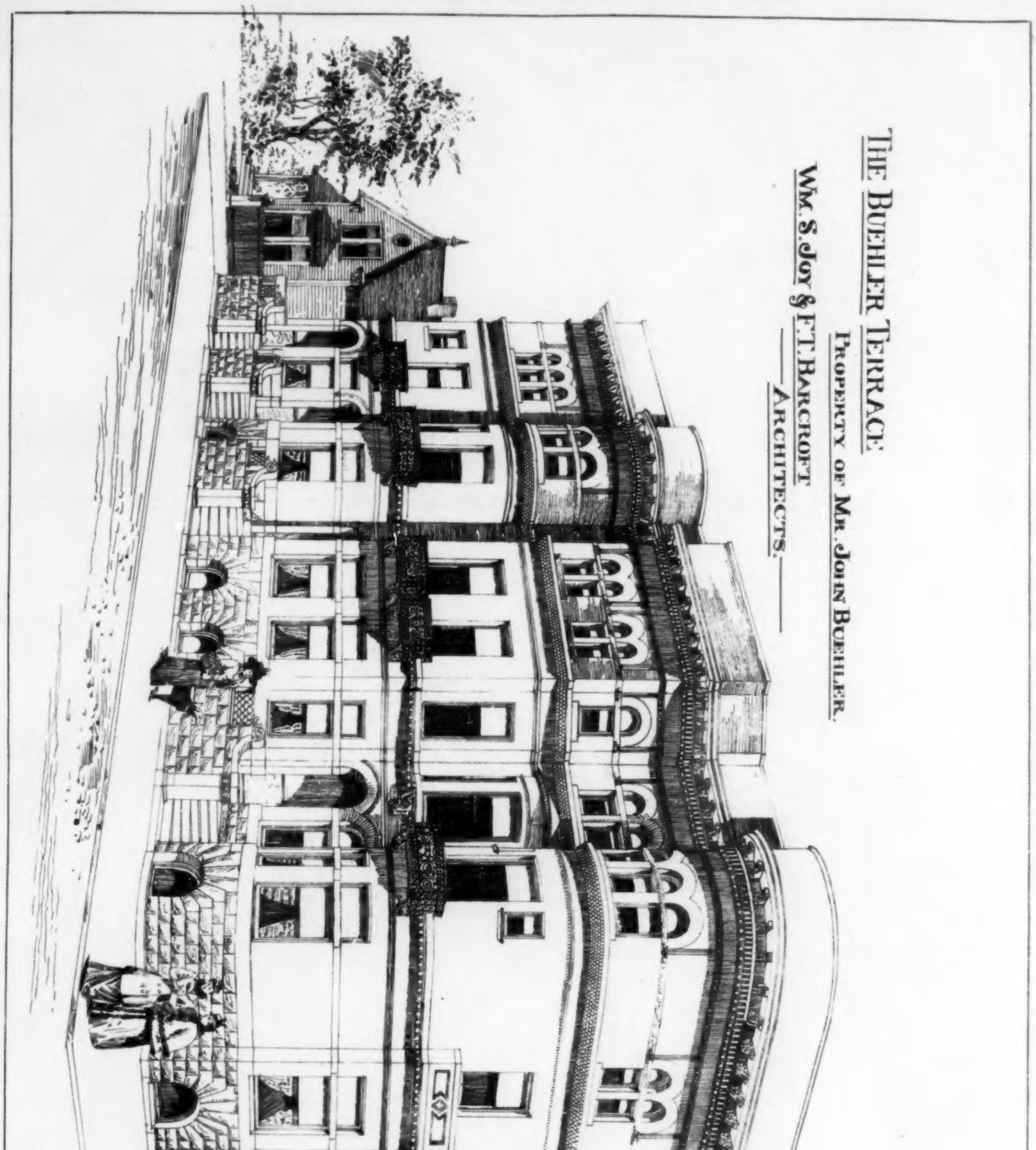

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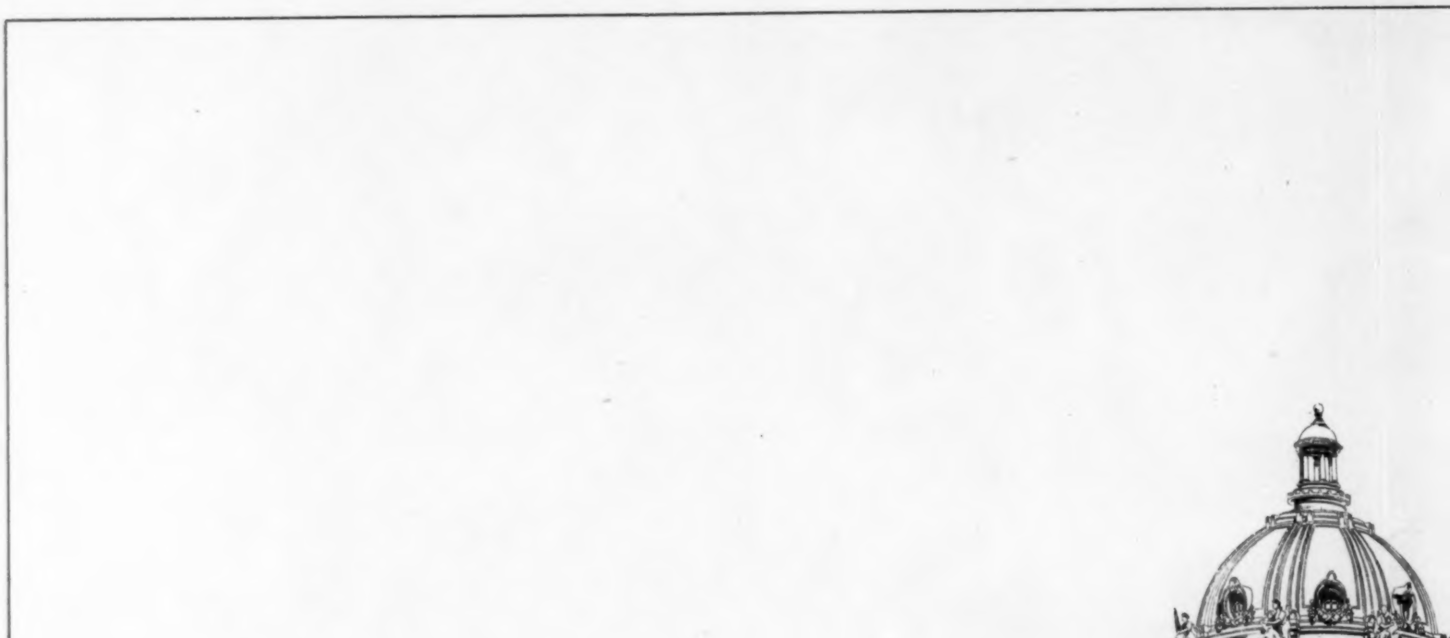

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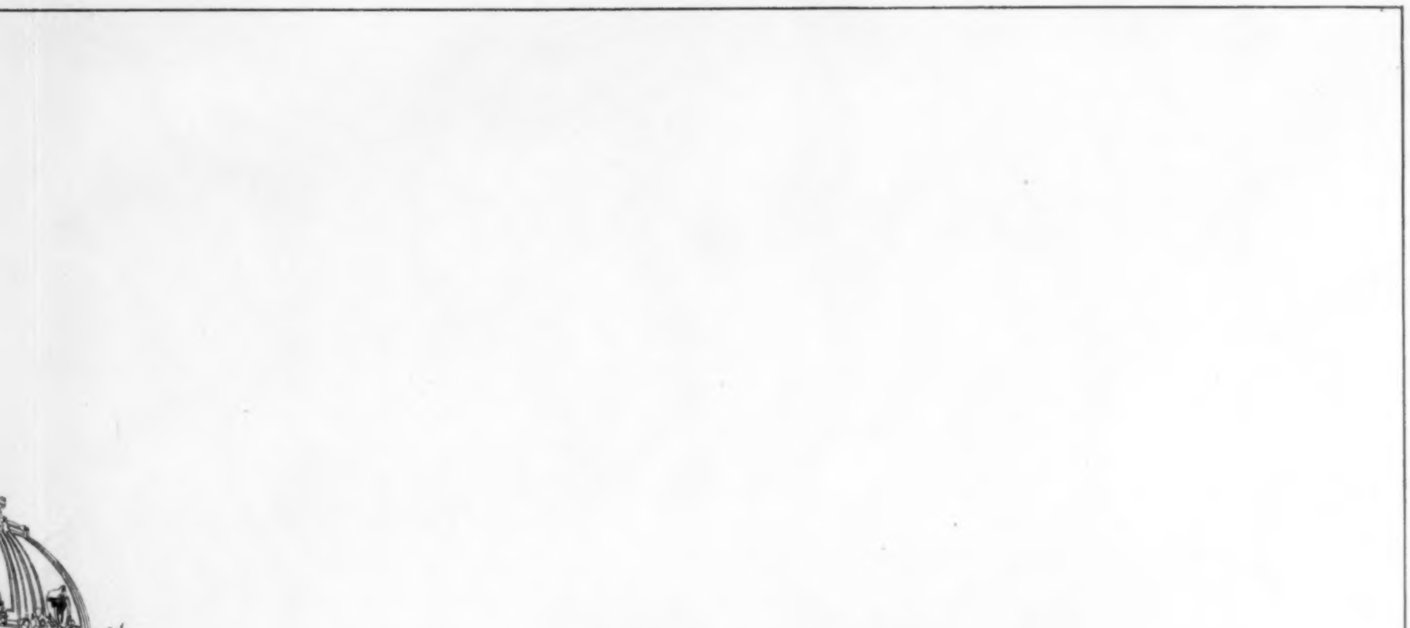

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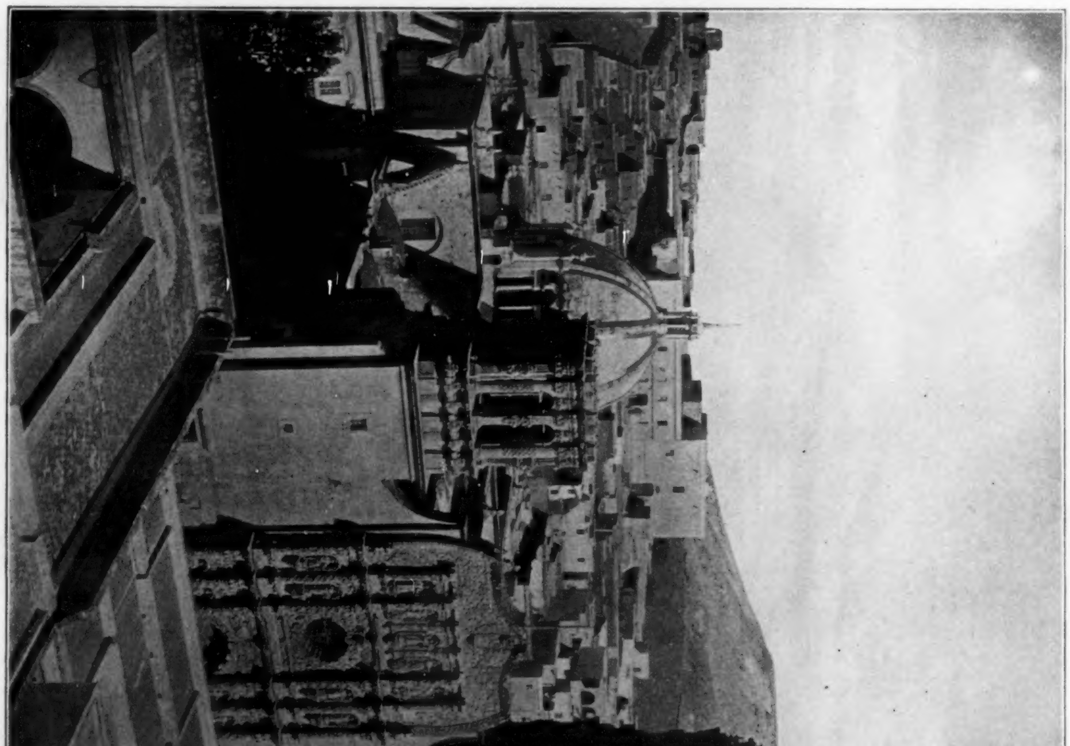

View of Zacatecas, Mexico.